

Limited Visual Dam Safety Inspection Summary Report

MA-047

Piiholo 50 MG Reservoir

Maui, Hawaii

Prepared by:

U.S. ARMY CORPS OF ENGINEERS HONOLULU ENGINEER DISTRICT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

May 2006

Dam ID: <u>MA-0047</u>
Name: <u>Piiholo 50 MG Reservoir</u>

Limited Visual Dam Safety Inspection Conducted on: 05 April 2006

I. Purpose

Due to disaster occurrences of periodic heavy rains and flooding, which has caused extensive damage to property and loss of lives, the Governor has issued a State of Emergency Proclamation extending from February 20, 2006 to April 9, 2006. In light of the tragic failure of the Kaloko dam on Kauai and the continued forecast of heavy rains, emergency inspections of all regulated dams in all counties are being undertaken.

These inspections are for the purpose of determining if any of the regulated dams and reservoirs in the City and County of Honolulu, Maui County or Hawaii County, are suspect for immediate concern to the downstream area under the prolonged conditions of heavy rain showers.

II. Authority

Inspections are authorized under the Hawaii Dam Safety Act of 1987, Chapter 179D "Dams and Reservoirs" of Hawaii Revised Statues, and Title 13, Subtitle 7, Chapter 190, "Dams and Reservoirs" of the Hawaii Administrative Rules.

These inspections are being conducted under joint agreements of the U.S. Army Corps of Engineers (USACE), the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), and the State of Hawaii. The Memorandum of Agreement with the U.S. Army Corps of Engineers is entered into pursuant to 10 U.S.C. § 3036(d)(2), and the Intergovernmental Cooperation Act (31 U.S.C. §6505), and established via support agreement number DL-06-01.

III. Scope

Visual inspection will be made on parts of the embankment and appurtenant works readily available and visible for inspection by the inspection team at the time of the inspection. Such parts and appurtenant works would include the upstream slope, crest, downstream slope, abutments and toes, outlet works, and spillway.

On the date of this limited visual inspection, there may appear to be no immediate threat to the safety of the dam, however no assurance can be made regarding the dam's condition after this date. Subsequent adverse weather and other factors may affect the dam's condition.

Name: Piiholo 50 MG Reservoir

IV. Limitations of Findings and Recommendations

The inspection is based only on visible features/areas of the dam on the day of inspection. The inspection does not entail detailed stability, hydrologic, hydraulic, or seismic investigations. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies.

V. Inspection Team

 Organization
 Name /Title

 U.S. Army Corps of Engineers
 Troy O'Neal, P.E.

Geotechnical Engineer

State of Hawaii, Dept. of Land and Natural Resources Gordon Chong

DNLR, Engineering Division

VI. Owner's Representatives Present

Maui County, Department of Water Supply

Maui County, Department of Water Supply

Paul Seitz

Walter Hager

VII. Summary Report Team

Organization
U.S. Army Corps of Engineers
Derek Chow
Bill Empson

State of Hawaii, Dept. of Land and Natural Resources Denise Manuel Edwin Matsuda

VIII. Dam Type

The dam appeared to be an earthen embankment dam.

Dam ID: <u>MA-0047</u>

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IX. Dam Classification

The current hazard classification of this dam is: Significant

Hazard Potential Classification based on the following:

Category	Loss of Life	Economic Loss
Low	None Expected	Minimal (undeveloped to
		occasional structures
		or agriculture)
Significant	Few (No Urban development and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than a few	Extensive community, industry or agriculture.

Based on inventoried storage and height data, the size classification of the dam is: Most likely small but insufficient information is available to inspectors to make a determination.

Size Classification based on the following:

Category	Storage (Acre-Feet)	Height (feet)
Small	< 1000	< 40
Intermediate	> 1000 and < 50,000	> 40 and < 100
Large	> 50,000	> 100

X. Summary of Inspection:

Condition Rating Criteria: The conditional terms in this report are used to generally describe the conditions below. Inspections, monitoring, and additional investigations are considered to be incidental to all condition ratings.

Satisfactory Expected to fulfill intended function.

Fair Expected to fulfill intended function, but maintenance is

recommended.

Poor May not fulfill intended function; maintenance or repairs are

necessary.

Unsatisfactory Is not expected to fulfill intended function; repair, replacement, or

modification is necessary.

Unknown Not visible, not accessible, not inspected, or unable to determine

the condition rating based on the observation taken.

Name: Piiholo 50 MG Reservoir

A. General appearance:

The reservoir consists of an earth dam built from on-site material from cuts into the upstream slope. The reservoir receives water from the nearby Opanga gouge collection system and feeds a water treatment plant located immediately downstream. The dam is roughly 38 feet in height and has a 14 ft high separator wall in the water that bisects the reservoir to promote maintenance.

Findings and Corrective Actions:

- a. The Owner shall maintain documentations including Construction plans, specifications, improvements, modifications, Operations and Maintenance Manuals and routine inspection logs for this dam facility.
- b. An EAP is recommended for all dams regardless of hazard class. Submit EAP if developed for the facility.
- c. Routine inspection logs were not inspected.
- d. Access to site appears to be satisfactory.
- e. Submit current Operations and Maintenance Manual or Procedures for this dam / reservoir facility.
- f. Submit Site or Facility Map of this Dam which identifies the location of major features including outlet works controls and conduits.
- g. Emergency Alarms / Monitors: There were no alarms or monitors observed on this reservoir.
- h. Power / Communication: There were no communication systems observed on this reservoir.

B. Access / Security:

Access to the dam was accomplished via a County roadway. A four wheel drive vehicle is not required.

Security issues: Access to the dam is unrestricted.

C. Intake Works: (Unknown)

There was DIP intake pipe of unknown size that feeds a 12-inch DIP line that tees at the downstream end of the reservoir. This tee allows for control of inflow in toe each half of the reservoir. The pipe can be controlled by a valve and the flow can either be shut off or bypassed.

Findings and Corrective Actions:

- a. The intake works were not inspected.
- b. The intake works were not tested.

Name: Piiholo 50 MG Reservoir

D. Reservoir: (Fair)

The reservoir level was 28 feet per reservoir depth. The normal operating level is 28 feet per reservoir depth. The reservoir is operated to maintain level pool, but may lower during periods of drought. A staff gage did not exist at the time of inspection.

Findings and Corrective Actions:

- a. The reservoir appeared to be in fair condition and requires corrective action.
- b. A staff gage was not observed at the reservoir. Provide some method of quantifying the water level within the reservoir.

E. Upstream Slope: (Satisfactory)

The upstream slope was 1 on 1 and consists pf a HDPE linear overlain with poured concrete.

Findings and Corrective Actions:

a. The upstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.

F. Crest: (Satisfactory)

The dam crest was approximately 20 feet wide. There was a dirt access road on top of the crest.

Findings and Corrective Actions:

- a. The dam crest appeared to be in satisfactory condition, no corrective actions are required at this time.
- b. Access along the crest was satisfactory.

G. Downstream Slope: (Fair)

The downstream slope was approximately 1H on 1V (Horizontal/Vertical). There was low ground cover and some bushes and tall grass, and it was being cleared at the time of inspection. There was access to the lower roadway along the toe. Erosion was observed on the downstream slope. Sinkholes were not observed on the downstream slope.

Seepage was not observed on the downstream toe.

Findings and Corrective Actions:

- a. The downstream slope appeared to be in fair and requires corrective action.
- b. The downstream slope was not visible (in locations) due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.
- c. The slope was very steep, around a 1 to 1 slope; further study is required to verify stability.

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H. Abutments / Toe: (Satisfactory)

The abutments and toe were generally clear and no seepage or erosion was observed.

Findings and Corrective Actions:

a. The abutments/toe appeared to be in satisfactory condition, no corrective actions are required at this time.

I. Outlet Works: (Satisfactory)

There were 2 outlet works pipes that are 12 inch in diameter running to the treatment plant. The pipes are DIP, and the valve is located on the downstream side.

Findings and Corrective Actions:

- a. The outlet works were not inspected. (Submerged intake in reservoir.)
- b. The outlet works appeared to be in satisfactory condition, no corrective actions are required at this time.

J. Spillway: (Satisfactory)

This spillway consisted of dual 18" diameter morning glory spillways. The rough dimensions are two 1.5' diameters, and an invert elevation of 28 feet. The spillway approach was clear. There was no erosion observed near the spillway.

Findings and Corrective Actions:

a. The Spillway appeared to be in satisfactory condition, no corrective actions are required at this time.

K. Down Stream Channel: (Fair)

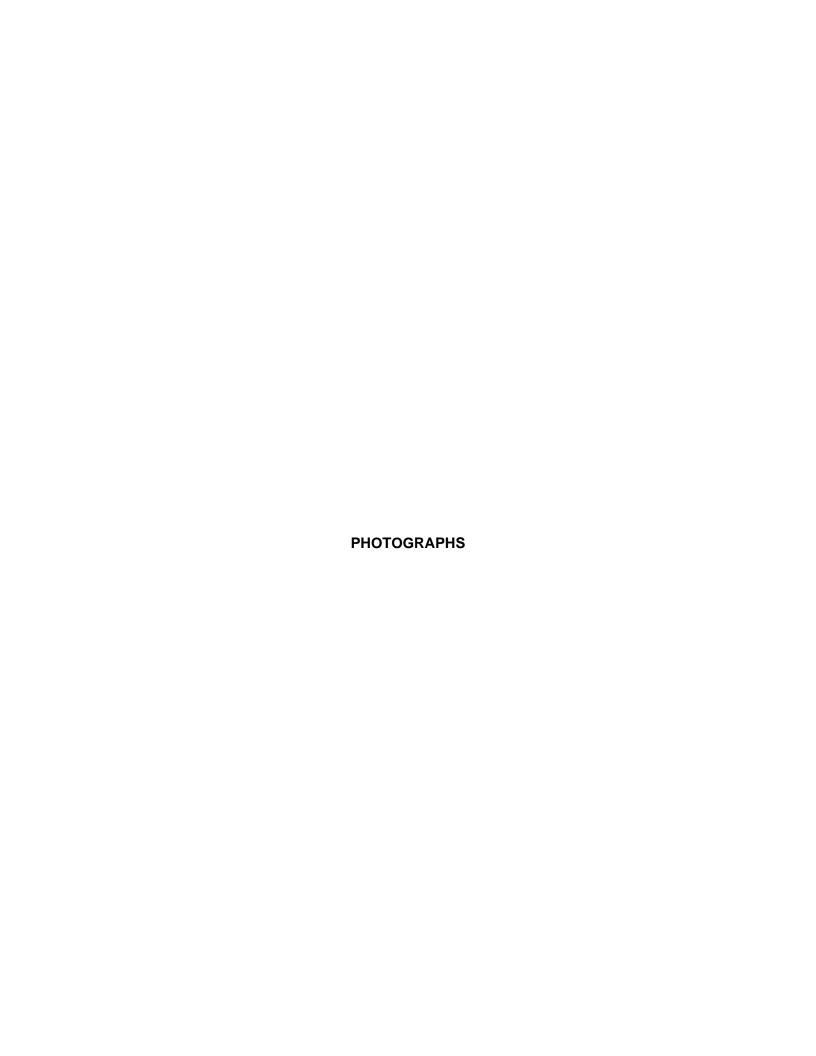
There is a well-defined downstream channel.

Findings and Corrective Actions:

- a. The downstream channel was not inspected.
- b. The downstream channel appeared to be in fair to poor condition and requires corrective action.

XI. Additional Comments:

Based on visual observations and discussion of operational procedures of the dam, there is no immediate threat to the safety of the dam at this time.



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047 View of dual 12-inch pipes at downstream end of reservoir.

MA-047 Piiholo 50 MG Reservoir



047 Right Crest of Reservoir - View of mowed right crest.



Dam ID: MA-0047 PIIHOLO 50 MG RESERVOIR

Vulnerability Index: Extreme High Moderate Low 1 2 3 4

STATE OF HAWAII - DLNR

Inspec	tion No:
Date:	4/5/06

DAM SAFETY INSPECTION SHEET

		Affiliation					Phor	ne Numbe	er	
TROY O'NEAL		US Army Co	US Army Corps of Engineers							
GORDON C		DLNI								
PAUL SELTZ		MAUL CO.		OF WA	TER		_			
Weather Condition:		□ Rainy □ Drizz				`		y □ Sunny		Ory
1. General: (Information	on currently on file, updat	e as required)								***************************************
Dam/Res. Name	PIIHOLO 50 MG F	RESERVOIR							,	
Owner	Maui County Den	artment of Water S	vlagu						10	<u> 2037</u>
	Madi County, Dep									
Owner Contact	Mr. Walter Hager				Owne	r Ph		,		
Owner Contact Lessee	Mr. Walter Hager				Lesse	e Ph.				
•	Mr. Walter Hager				Lesse O & N	e Ph. I Ph				
Lessee O & M Contractor	Mr. Walter Hager				Lesse O & N	e Ph. I Ph				
Lessee O & M Contractor Nearest Town	Mr. Walter Hager				Lesse O & M Latitud	e Ph. I Ph de _		20.833	3° (deci	imal
Lessee O & M Contractor Nearest Town County	Mr. Walter Hager				Lesse O & M Latitud	e Ph. I Ph de _		20.833	3° (deci	imal
Lessee O & M Contractor Nearest Town County Tax Map Key(s)	Mr. Walter Hager KOKOMO MAUI (2)4-3-001:031 and	d 4-4-002:015 & 01	8		Lesse O & M Latitud Longit	e Ph. I Ph de _ ude _		20.8333 156.276	3 ° (deci	imal
Lessee O & M Contractor Nearest Town County Tax Map Key(s) Dam Status	Mr. Walter Hager KOKOMO MAUI (2)4-3-001:031 and	d 4-4-002:015 & 01 Hazard Potential :	8 S:		Lesse O & N Latitud Longit	e Ph. I Ph de _ ude _ Dam		20.833 156.276	3° (deci	imal imal
Lessee O & M Contractor Nearest Town County Tax Map Key(s) Dam Status Year Completed	Mr. Walter Hager KOKOMO MAUI (2)4-3-001:031 and A: 1971	d 4-4-002:015 & 01 Hazard Potential of the control	8 S:	1700	Lesse O & M Latitud Longit	e Ph. I Ph de _ ude _ Dam Dam	Size	20.833 156.276	3° (deci	imal imal
Lessee O & M Contractor Nearest Town County Tax Map Key(s) Dam Status Year Completed Normal Storage	Mr. Walter Hager KOKOMO MAUI (2)4-3-001:031 and	d 4-4-002:015 & 01 Hazard Potential Dam Length Max. Storage	8 S:	1700	Lesse O & M Latitud Longit ft. ac.ft.	e Ph. I Ph. de _ ude _ Dam Dam Max.	Size_ Height _	20.8333 156.276	3° (deci 7° (deci	imal imal ft ac

Dam ID: MA-0047 PIIHOLO 50 MG RESERVOIR				Inspection No: Date:4/5/06
2. Questions for Owner's Rep.:		<u>No</u> !	Unknown □	Comments
Construction Plans Available	Z Z			
Site / Facility Map		Ø		
Operation & Maintenance Manua		X		
Emergency Action Plan		X		
Modifications / Improvements	~			
Conduct Routine Inspections	X			
Conduct Routine Maintenance	Σĺ.			Elvis
Vehicle access to site	Ø Ø			□ Not accessible □ With Standard car Requires 4-Wheel Drive
Access during heavy rains				□ Not accessible □ With Standard car ☒ Requires 4-Wheel Drive ☒
Access when spillway is flowing	凶			☐ Not accessible ☐ With Standard car ☐ Requires 4-Wheel Drive
Other Studies Conducted		Þ.		☐ Phase I ☐ Phase II ☐ Hydraulics ☐ Stability ☐ Hazard ☐ Seismic ☐ Other:
Incident History		以		☐ Breached ☐ Overtop ☐ Slide ☐ Down stream Flooding ☐ Other:
Reservoir's Current Use	X			☐ Sediment 💢 Irrigation ☐ Recreation ☐ Flood Control ☐ Drinking Water ☐ Power Generation ☐ Other:
d. An EAP is recommende e. Submit narrative and addam site, unless covered f. Routine inspection logs of g. Dam owners shall provid h. The dam did not appear i. Access to site appears to j. There is no vehicular access provided. l. Access to dam is question and emergency plans not generated to promptly advocircumstance or occurred m. Submit current Operatio	d for a ditional d by a were to be so be so cess to conable eed to tive of tise the cons and a mean a mean and a mean a mean and a mean and a mean a mean and a mean a mean a mean a mean a mean a mea	all dar al info pprov not in routir main satisfa to the e duri reflect the ii e dep which d Mai	ms regard ormation of yed dam p spected. ne inspect tained on actory. dam site. ng severe ct this def ncident, repartment of may adventenance	ion of the dam.
□ □ Ph □ □ Hy □ □ Sta □ □ Se □ □ Ha	ase I ase II drolog ability ismic	Study Stud gy and Analy Analy	y (Includir d Hydrauli /sis	ng □ Seepage □ Hydrology/Hydraulics □ EAP) ics (including Probable Maximum Flood and spillway capacity)

Dam ID:	MA-0047
PIIHOLO S	50 MG RESERVOIR

Inspec	tion No:
Date:	4/5/06

	rvoir:				RESERVOIR		
	Level during inspec	tion _	28	ft per	DEPTH	(gage / (ther)	
	Normal Operating I	_evel/Range	78	ft per	/1	(gage / other)	
		Description: RI	SERVOIR I	OPERAT	ED TO HAI	NTAIN LEVEL PE	OL BUT MAY LO
	Typical Operation	☐ Spillway alwa	ays flowing Ke	pt within norm	nal range ☐ Kept	Empty Drained Daily Empty Empty Drained Daily Empty Empty	
	Sinkhole in Res.:					in. Deep □ Not Visible	None Observed
	Sirikilole III ives					III. Deep 12 Not visible	
	Staff Gage:						
	Stall Gage.	Description.			· · · · · · · · · · · · · · · · · · ·		
	lings:						
	a. The reservoir	-					
						actions are required at t	this time.
叉	c. The reservoir	appeared to b	e in fair to poo	r condition	and requires co	orrective action.	
´□`	d. The reservoir	appeared to b	e in unsatisfac	tory conditi	on, urgent corr	ective action is required	l .
_							
	rective Actions:	noodo maint	ononco andic-	ropoir Do	scription:		
						ad of quantifying the wa	
X	reservoir.	as not observ	ed at the reser	VOII. PIOVI	de some meur	od of quantifying the wa	ter lever within the
П		s observed in	the unstream i	eservoir (Conduct addition	nal investigations and n	nonitorina to
LJ			appropriate act		Jonador addina	nai myoodgadono ama n	
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	11.						
	ke Works Descri						
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intak	Ke Works Descrip Number of Intakes Intake Culvert / (Size: Control:	otion: ②iDe in. iXOII Gate (XValve	<i>VNKNOWN</i> P □ Corrugated M X Flow can eithe	STZ Metal □ PVC or be Shut off	E LOUE □ HDPE □ Co or Bypassed		
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intak	Ke Works Description Number of Intakes Intake Culvert / (Size: Control: From: Ditch / Flume Dimension:	otion:in. IXDII Gate IXValve Stream Diversion	レドドルのいた P □ Corrugated M IX Flow can eithe □ Pump □ Res □ (Size x Depth)	STZ; Metal □ PVC or be Shut off ervoir Shape	E LOUE □ HDPE □ Co or Bypassed □ Other		
Intak	Ke Works Description Number of Intakes Intake Culvert / (Size: Control: From: Dittch / Flume Dimension: Surface:	otion: in. ☑OII Gate ☑Valve Stream Diversion	UNKNOWN P□ Corrugated M Flow can eithe □ Pump□ Res □ (Size x Depth) □ Concrete	STZ; Metal □ PVC or be Shut off ervoir Shape □	E LOUE HDPE Co or Bypassed Other		
Intak	Ke Works Description Number of Intakes Intake Culvert / Size: Control: From: Ditch / Flume Dimension: Surface: Control:	otion:in.	レドドルのいた P □ Corrugated M IX Flow can eithe □ Pump □ Res □ (Size x Depth)	STZ/ Metal □ PVC or be Shut off ervoir Shape □ or be Shut off	E LOUE □ HDPE □ Co or Bypassed □ Other Lined w/ or Bypassed		

Dam ID:	MA-0047
PIIHOLO	50 MG RESERVOIR

Inspection	No:
Date:	4/5/06
	,

5.	Upstream Slope: Slope Protection:	(Typical Slope ±;) □ None □ Dumped Rock □ Fitted Rip Rap □ Grouted Rip Rap ☒ Liner □ Other:
		□ Defect in Protection: Description: AND POURED CONCRETE
	Erosion:	□ Loose soil w/ little vegetation □ Rut (<6") □ Gully (>6" deep) □ Not Visible ▼ None Observed
		Description:
	Cracks:	☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ☐ Not Visible ☑ None Observed
		Description:
	Sinkholes:	☐ # Observed: Size: and Depth ☐ Not Visible ☐ None Observed
		Description:
	Vegetation:	None Low Ground Cover Bushes or Tall Grass Trees #
		Description:
	 □ b. The upstream □ c. The upstream □ d. The upstream Urgent correct Corrective Actions: □ e. Slope protection 	slope was not inspected. slope appeared to be in satisfactory condition, no corrective actions are required at this time. slope appeared to be in fair to poor condition and requires corrective action. slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. tive action is required.
		lly erosion was observed on the slope, which requires maintenance and/or repair.
	☐ g. A crack was o	bserved on the slope, which requires further investigation to determine the underlining cause. ea and/or repair as required.
	☐ h. A sinkhole wa	s observed on the slope, which requires further investigation to determine the underlining cause. onitor the area.
	•	slope was not visible due to high grass and bush vegetation. Clear high vegetation and o enable easy visual inspection.
	☐ j. Tree(s) were of failures, and concrective act of the tree and All repair work	observed on the dam embankment. Trees have been identified as the probably cause of piping an possibly cause sever damage to the embankment if they are uprooted during a high winds. ion is required to remove the tree hazards from the dam. Acceptable remedies include removal it its root structure down to a 2" diameter and reconstructing the damaged embankment section. It shall be accomplished as per the requirements of licensed geotechnical or structural engineer. In the damaged area for signs of settlement and seepage.

Approximate Crest Width: 20 FT 6. Crest: ☐ Roadway, Surface / Width / Usage: Access: ☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) None Observed ☐ Not Visible Erosion: Description: __ ☐ Not Visible None Observed ☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible Cracks: Description: x _____ in. Long x ____ in. Deep

Not Visible None Observed Sinkholes: ☐ _____ in. Wide Description: □ None X Low Ground Cover □ Bushes or Tall Grass □ Trees #____ □ <6" Vegetation: □ >20" Description: Findings: □ a. The dam crest was not inspected. b. The dam crest appeared to be in satisfactory condition, no corrective actions are required at this time. ☐ c. The dam crest appeared to be in fair to poor condition and requires corrective action. d. The dam crest appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required. Corrective Actions: e. Access along the crest was satisfactory. f. Access along the crest was not possible. Description: ☐ g. Rut and/or Gully erosion was observed on the crest, which requires maintenance and/or repair. Description: h. A crack was observed on the crest, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required. i. A sinkhole was observed on the crest, which requires further investigation to determine the underlining cause. Repair and monitor the area. ☐ i. Portions of the crest were not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection. ☐ k. Tree(s) were observed along the dam crest. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal

of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer.

Routinely monitor the damaged area for signs of settlement and seepage.

Inspection No:

Date:

Dam ID: MA-0047

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Dam ID:	MA-0047
PIIHOLO	50 MG RESERVOIR

Inspection No:				
4/5/06				

Dowr	stream Slope:				(Typical Slop	e ±:)
1	Access:	lower roadway along toe	□ roadway t	to outlet works	☐ walkway to ou	itlet works None Observed
5	Slope Protection:	None □ Dumped Rock	☐ Rip Rap	☐ Grouted Rip Rap	☐ Concrete	,
E	Erosion:	☐ Loose soil w/ little vegetati			□ Not Visible	None Observed
(Cracks:	☐ Parallel with crest ☐ Pe	erpendicular to c	rest Slide visible	☐ Not Visible	None Observed
(Sinkholes:	Description: in. Wide x	in. Long	x in. Dee	p 🗆 Not Visible	
\	/egetation:	Description: Cow Ground Co	ver 🕽 Bushes	or Tall Grass Tre	es# □ <	:6" □>6"&<20" □>20" ED AT TIME OF INSP
\$	Seepage:	Seep Spot Number 1 ☐ Green Vegetation ☐ Flowing, Description:	Wet or Muddy Gi	round □ Ponding Wa	ter □ Not Visible	None Observed
		Water Clarity: ☐ Clear ☐ S Description:				
		Seep Spot Number 2	Wet or Muddy Gi	round □ Ponding Wa	ter □ Not Visible	
		Description:				
	a. The downstreab. The downstreac. The downstread. The downstrea	am slope appeared to be am slope appeared to be	in satisfactor in fair to poo in unsatisfac	r condition and re	quires correctiv	
Corre	 a. The downstrea b. The downstrea c. The downstrea d. The downstrea function. Urge 	am slope appeared to be am slope appeared to be am slope appeared to be ant corrective action is re	in satisfactor in fair to poo in unsatisfac quired.	or condition and re story condition and	quires correctiv not expected t	e action. o fulfill its intended
Corre	 a. The downstrea b. The downstrea c. The downstrea d. The downstrea function. Urge ective Actions: e. Slope protection 	am slope appeared to be am slope appeared to be am slope appeared to be ant corrective action is re on needs maintenance of	in satisfactor in fair to poo in unsatisfac quired. r repair. Des	or condition and rectory condition and	quires correctiv not expected t	e action. o fulfill its intended
Corre	a. The downstread of the downs	am slope appeared to be am slope appeared to be am slope appeared to be ant corrective action is re on needs maintenance of	in satisfactor in fair to poor in unsatisfactor quired. r repair. Des I on the slope	cription: which requires number further investigation	quires correctiv	e action. o fulfill its intended d/or repair.
Corre	a. The downstread of the downs	am slope appeared to be am slope appeared to be am slope appeared to be an terrective action is reconnected maintenance of a slope and/or repair as requise observed on the slope, when and/or repair as requise observed on the slope,	in satisfactor in fair to poor in unsatisfactor quired. r repair. Des I on the slope nich requires red.	cription: , which requires notice the condition and condi	quires corrective not expected to not expected to naintenance and not to determine	e action. o fulfill its intended d/or repair.
Corre	a. The downstread of the down stread of	am slope appeared to be am slope appeared to be am slope appeared to be an slope appeared to be an slope appeared to be an torrective action is reconnected maintenance of the slope, where and/or repair as requise observed on the slope, onitor the area. It is an slope was not visible to enable easy visual inspections.	in satisfactor in fair to poor in unsatisfactor quired. r repair. Des I on the slope nich requires red. which requires edue to high opection.	cription: cription: they which requires not further investigation further investigation grass and bush very	quires corrective not expected to not expected to naintenance and on to determine ation to determine egetation. Clear	e action. o fulfill its intended d/or repair. the underlining cause. ine the underlining cause. r high vegetation and
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Corre	a. The downstread of the downstread of the downstread function. Urge function. Urge function. Urge function. Urge function. Urge function. Urge function for the arch function	am slope appeared to be am slope appeared to be am slope appeared to be an needs maintenance of an needs maintenance of an and/or repair as requises observed on the slope, on itor the area. It is a slope was not visible to enable easy visual inspection of the downstructure on is required to remove its root structure down to shall be accomplished as appeared to be accomplished as a slope appeared to remove an appeared to structure down to shall be accomplished as a slope appeared to be accomplished as a slope accomplished as a sl	in satisfactor in fair to poor in unsatisfactor in unsatisfactor in unsatisfactor quired. r repair. Des I on the slope ich requires red. which requires red. which require edue to high or bection. eam slope. To damage to the the tree haze to a 2" diamet as per the require or signs of see Monitor and	cription: cription: cription: cription: further investigation grass and bush verifies have been in the embankment if the ards from the dampter and reconstruction conduct further	quires corrective not expected to not expected to naintenance and on to determine ation to determine deter	e action. o fulfill its intended d/or repair. the underlining cause. ine the underlining cause. r high vegetation and probably cause of piping ed during a high winds. emedies include removal ed embankment section. cal or structural engineer.
Corre	a. The downstread of the downstread of the downstread function. Urge function: a. Slope protection: b. Slope protection: c. A crack was of Monitor the are maintain low to the down streemaintain low to the down streemaintain low to the tree and All repair work Routinely mon seepage/Pond water and extermal	am slope appeared to be am slope appeared to be am slope appeared to be an torrective action is reconnected and/or repair as required to the slope, and/or repair as required to the area. It is a slope was not visible to enable easy visual insposerved on the downstrean possibly cause sever on is required to remove its root structure down to shall be accomplished a sitor the damaged area for the damaged area for the damaged area for the slope, and possible hazar observed flowing and passibserved flowing and passibserved flowing and passibserved flowing and passible hazar observed flowing and passible	in satisfactors in fair to poor in unsatisfactors in unsatisfactors in unsatisfactors. I on the slope in the slope in the slope in the slope in the requires red. I on the slope in the requires red. I damage to the earn slope. It damage to the tree hazes or a 2" diameter sper the requires per the requires per the requires per the requires per the requires the slope in the tree hazes per the requires per the requirements.	cription: cription: which requires not restigated to the embankment if ards from the dampter and reconstructurements of licer titlement and seeped conduct further loping condition.	quires corrective not expected to not expected to naintenance and on to determine ation to determine determine determined as the they are uprooff. Acceptable reting the damag sed geotechnic age. investigation to noved by the floor noved by t	e action. o fulfill its intended d/or repair. the underlining cause. ine the underlining cause. r high vegetation and probably cause of piping ed during a high winds. emedies include removal ed embankment section. cal or structural engineer.
Corre	a. The downstread of the downstread function. Urge function function function. A sinkhole was Repair and more function. A sinkhole was Repair and more function. The down streemaintain low to get function function function function function. Seepage/Pondivater and extermal extermal function functi	am slope appeared to be am slope appeared to be am slope appeared to be an slope appeared to be an slope appeared to be an torrective action is reconnected an analysis of the area. The slope was not visible to enable easy visual insponsible to enable easy visual insponsible cause sever on is required to remove its root structure down to shall be accomplished a sitor the damaged area for the damaged area for the damaged area for the loss of soil from the easy of the loss of soil from the damaged and patche loss of soil from the damaged area for the loss of soil from the easy of the loss of soil from the damaged area for the loss of soil from the easy of the loss of soil from the damaged area for the loss of soil from the easy of the loss of the	in satisfactor in fair to poor in unsatisfactor in the slope To the slope To the slope To due to high or ection. To damage to the entry the tree haze as per the require	cription:	quires corrective not expected to maintenance and on to determine ation to determine ation to determine they are uprooff. Acceptable reting the damag sed geotechnicage. Investigation to moved by the flocinvestigation to moved by the flocinvestigation to the correction of the correc	e action. o fulfill its intended d/or repair. the underlining cause. Ine the underlining cause. In high vegetation and probably cause of piping ed during a high winds. emedies include removal ed embankment section. Ital or structural engineer. locate the source of ow. Take immediate determine the underlining

Dam ID:	MA-0047
PIIHOLO	50 MG RESERVOIR

8.

Inspection	ı No:
Date:	4/5/06

Abu		ents/Toe: osion:	☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) ☐ Not Visible 💢 None Observed
			Description:
	Cr	acks:	☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ☐ Not Visible ☒☐ None Observed
			Description:
	Ve	getation:	□ None
			Description:
	Se	epage:	Seep Spot Number 1 ☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ★ None Observed ☐ Flowing, Description:
			Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other:
			Description:
			Seep Spot Number 2 ☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ☐ None Observed ☐ Flowing, Description:
			Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other:
			Description:
Fine	dina	us:	
			s/toe were not inspected.
M			s/toe appeared to be in satisfactory condition, no corrective actions are required at this time.
	C.	The abutments	s/toe appeared to be in fair to poor condition and requires corrective action.
	d.		s/toe appeared to be in unsatisfactory condition and not expected to fulfill its intended function. ive action is required.
Cor	roc	tive Actions:	
			on needs maintenance or repair. Description:
		Rut and/or Gu	lly erosion was observed, which requires maintenance and/or repair.
	g.	A crack was o	bserved along the abutments/near the toe, which requires further investigation to determine the use. Monitor the area and/or repair as required.
	h.	The abutment	/toe area was not visible due to high grass and bush vegetation. Clear high vegetation and o enable easy visual inspection.
П	i	Tree(s) were	observed along the abutment/toe. Trees have been identified as the probably cause of piping
		failures, and c Corrective act of the tree and All repair work Routinely mon	an possibly cause sever damage to the embankment if they are uprooted during a high winds. ion is required to remove the tree hazards from the dam. Acceptable remedies include removal its root structure down to a 2" diameter and reconstructing the damaged embankment section. It is shall be accomplished as per the requirements of licensed geotechnical or structural engineer. In the damaged area for signs of settlement and seepage.
	j.	Seepage/Pond water and exter	ding water was observed. Monitor and conduct further investigation to locate the source of ent of any possible hazardous or developing condition.
	k.	Seepage was action to stop	observed flowing and particles were observed to be removed by the flow. Take immediate the loss of soil from the embankment. Conduct further investigation to determine the underlining e corrective action. Monitor the area.
	I.	· · · · · · · · · · · · · · · · · · ·	

											
9.	Out		Vorks: Ivert / Pipe Type / Size:	_	8"	à	l ユーI	NCH			TREATMENT
			Culvert:	☐ Concrete	☐ Masonr	у	□ unline	ed earth	□ Other		PLANT
			Pipe:	X DIP	☐ Corruga	ated Metal	☐ PVC	☐ HDPE	☐ Concrete	☐ Other _	
			Control Type:	: □ Gate	XValve	☐ Oth	er				
			Location:	☐ Control on							
			Seepage:	☐ Green Veg					g Water □ Not Visible	e X4No	one Observed
				Water Clarity:	: □ Clear	☐ Some par	ticles	Muddy	☐ Other:		······································
				Description: _							
	Find	ling	is: The evillativian	den ware not	inanaataa	(CUPA	15かんどん	TATAL	E IN RESER	VOTU!	\
)CL		The outlet wor			1. (308/	PERGEL		e pri neder)
	EX.					eatiefactor	v conditio	n no corr	ective actions are	required	1 at this time
									ires corrective ac		ratuns une.
									ot expected to ful		ended function
		С.	Urgent correct	1 1			tory come	inion and n	or expected to fur	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
			J		·						
			ive Actions:								
			of any possible	e hazardous	or develo	ping cond	ition.				of water and extent
		g.	action to stop t	the loss of s on. Monitor	oil. Cond the area.	uct further Failures	investiga caused b	ation to det y seepage/	e removed by the termine the under piping along the o	lining ca	use and take
			Were not visib easy visual ins	•	gh grass a	ınd bush v	egetatior	ı. Clear hiç	gh vegetation and	maintai	n low to enable

□ j. _____

Dam ID: <u>MA-0047</u>

PIIHOLO 50 MG RESERVOIR

Dam ID: <u>MA-0047</u>	TOTAL PROPERTY OF THE PROPERTY		Inspection No:
PIIHOLO 50 MG RESERVOIR			Date: 4/5/06
		L	
10. Spillway:			
	None □ Culvert/Pipe □ Channel 🖁	OVAL 18"DIA	YORNING GLORY SPILLLAYS
	scription:		
Dimension: Two	1.5 DEA ft. Invert eleva	ition: 28 ft. per-	
Slope Protection: □ N	None □ Grass □ Dumped Rock	☐ Fitted Rip Rap ☐ G	Grouted Rip Rap 🛣 Concrete
	Defect in Protection: Description:		
• •			
Erosion:	Scour □ Gully □ Headcut	Not Observed □ C	Other:
	scription:		
, .			□ <6" □ >6" & <20" □ >20"
Des Findings:	scription:		
	eared to be in satisfactory condition	n, no corrective actions a	are required at this time.
□ b. The Spillway appe	eared to be in fair to poor condition	n and requires corrective	action.
		ition and not expected to	fulfill its intended function. Urgent
corrective action is	s required.		
Corrective Actions:			
	eeds maintenance or repair. Des		
	pach was blocked. Clear approac		
	sion was observed which requires	•	
	Il drop in channel due to erosion)		
	to prevent this problem from mov		in of the spinway. Corrective
· · · · · · · · · · · · · · · · · · ·	table in the spillway channel and	approach. Take correcti	ve action to address the woody
·	n and repair the damaged area.		the state of the s
	is adequately sized. Spillway she corrective action as required.	ould pass the probable m	laximum flood. Verity spiliway
	concentre denon de required.		
11. Down Stream Channel:			
Name:	NONE		
	mp ☐ Open Area ☐ Un-Defined Drain	age-way 💢 Defined, Drainag	e-way D Other
Items along Stream E		TI TOWN /VALLEY	☐ Not Inspected
Description:	, ,	ISES LITOWIT ALONG	, = 1.01.11.05
D 00011p110711		END	
Findings:			
	channel was not inspected.	122	
b. The downstream of time.	channel appeared to be in satisfa	ctory condition, no correc	ctive actions are required at this
	channel appeared to be in fair to p	poor condition and require	es corrective action.
	channel appeared to be in unsatis		
	corrective action is required.	•	•

Corrective Actions:

□ e. _____

Dam IĎ: MA-0047 PIIHOLO 50 MG RESERVOIR		Inspection No:
	de regarding the dam's condition	e no immediate threat to the safety of the after this date. Subsequent adverse weather
PROCEDURES OF T		USSION OF OPERATIONAL S NO IMMEDIATE THREAT HIS TIME.

Limitations and Intent of this Dam Safety Inspection:

This Dam Safety Inspection was conducted to assess the general overall condition of the reservoir/dam, identify visible deficiencies, and recommend areas of for monitoring, additional investigative studies and corrective actions. The inspection is based only on visible features/areas of the dam on the day of inspection. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies. The inspection was conducted under the authority of the Hawaii Revised Statures Chapter 179D, and Hawaii Administrative Rules, Title 13, Chapter 190, titled "Dams and Reservoirs". Questions regarding this inspection should be forwarded to the Hawaii State Dam Safety Program; PO Box 373; Honolulu, Hawaii 96809; Ph. (808) 587-0236.

Revised: Dec. 1, 2003